B4 and nitrogen, and carbon and the additional gas is present during the adding of the gas containing the first and second elements.

B5 35. (Amended) The method according to claim 19, wherein the structure comprises at least one conductor line in copper.

36. (Amended) The method according to claim 19, further comprising fabricating interconnection levels in copper on semiconductor devices.--

SUPPORT FOR THE AMENDMENT

Support for the above amendment is found throughout the specification and in the original claims. No new matter is believed to be introduced by the above amendment.

REMARKS

Claim 24 is cancelled. Claims 19-23 and 25-36 are pending. Favorable consideration is respectfully requested.

At the outset, Applicants thank Examiner Chen for the helpful suggestions during the courteous discussion of the present application held on May 22, 2003, the substance of which is reviewed and expanded upon below. Further, Applicants thank Examiner Chen for indicating that the above amendment combined with the remarks below would further favorable prosecution of the present application.

The rejections of Claims19-34 under 35 U.S.C. § 103(a) over Batey et al. and/or Freeman are believed to be obviated by the above amendment. Further, Batey et al. and/or Freeman fail to disclose or suggest the claimed invention in light of the following remarks.

Batey et al. discloses, at best, a method of depositing a layer of silicon nitride over copper (see col. 3, lines 11-19) by PECVD (see col. 5, lines 21-22) using silane and nitrogen precursors and helium thereafter (see col. 5, lines 45-48 and col. 6, line 1).

Freeman discloses, at best, a method of depositing silicon nitride on a copper-containing substrate with a silicon source (i.e. silane) and a nitrogen source in a chamber (see abstract) using a CVD apparatus (see col. 8, lines 41-44). The silicon and nitrogen source may be purged by an inert purging gas thereafter (see col. 26, lines 10-50).

In direct contrast to Batey et al. and/or Freeman, the claimed invention relates to a method in which a third gas containing at least one member selected from the group consisting of oxygen, nitrogen, and carbon is present during the addition of either of the first two gases. As suggested by Examiner Chen during the above-mentioned discussion, both Batey et al. and/or Freeman fail to disclose or suggest a method in which a third gas containing at least one member selected from the group consisting of oxygen, nitrogen, and carbon is present during the addition of either of the first two gases. Therefore, neither Batey et al. and/or Freeman disclose or suggest the claimed invention. Accordingly, withdrawal of these grounds of rejection are respectfully requested.

The rejection of Claims 35 and 36 under 35 U.S.C. § 101 is believed to be obviated by the above amendment. As indicated at the above-mentioned discussion, Applicants have amended Claims 35-36 in order to provide a further positive active step. Accordingly, withdrawal of this ground of rejection is respectfully requested.

The rejection of Claims 19-36 under 35 U.S.C. § 112, first paragraph, is believed to be obviated by the above amendment. More specifically, during the above-mentioned discussion, Examiner Chen kindly suggested for Applicants to remove the phrase "and its desired physical properties" to overcome this rejection. Therefore, Applicants have done so in accordance with the Examiner's suggestion. Further, Applicants thank Examiner Chen for

indicating and recognizing that the skilled artisan would recognize how to obtain a desired thickness by manipulation of the variables according to Claim 27. Accordingly, withdrawal of this ground of rejection is respectfully requested.

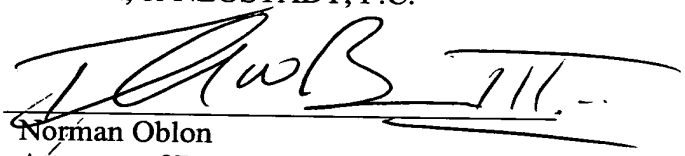
The rejection of Claims 19-36 under 35 U.S.C. § 112, second paragraph, is believed to be obviated by the above amendment. More specifically, Applicants have removed "apparent" from Claim 19, removed the word "type" from Claim 19, and clarified the third gas according to Claim 19. Further, Applicants have amended the claims to provide antecedent bases in accordance with all of the Examiner's suggestions. Finally, the claims have been amended to clarify the claimed invention and to provide proper Markush terminology. Accordingly, withdrawal of this ground of rejection is respectfully requested.

The objections to the Title and the Abstract are believed to be obviated by the above amendment. As indicated at the above-mentioned discussion, Applicants have removed "silicon-containing" from the title and provide a full substitute Abstract attached hereto. Accordingly, withdrawal of these grounds of objection are respectfully requested.

Applicants respectfully submit that the present application is now in condition for allowance. Early notice to this effect is respectfully requested. Should anything further be required to place this application in condition for allowance, the Examiner is requested to contact the undersigned by telephone.

Respectfully Submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER, & NEUSTADT, P.C.



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Marked-Up Copy
Serial No: 09/786,059
Amendment Filed on: HEREWITH

IN THE TITLE

--METHOD FOR DEPOSITING A [SILICON-CONTAINING] DIELECTRIC MATERIAL ON COPPER--

IN THE ABSTACT

--Please delete the Abstract at page 14, lines 1-21, in its entirety and replace the same with the substitute Abstract attached hereto.—

IN THE CLAIMS

--19. (Amended) A method for depositing a dielectric material on copper [apparent] on the surface of a structure, entailing the following steps:

placing the structure in a deposit chamber of [CVD type (Chemical Vapour Deposition)] chemical vapor deposition or plasma assisted chemical vapor deposition,

adding to the chamber a first gas forming a precursor for the formation of the dielectric material and containing an element able to contaminate copper,

adding to the chamber a second gas containing a chemical element intended, together with the element contained in the first gas and able to contaminate copper, to form said dielectric material, the second gas being able to react with the first gas to give [the] a deposit of dielectric material,

performing the deposit of dielectric material from the first gas and the second gas,

the method also comprising a step for adding a third gas able to prevent the contamination of copper by said element contained in the first gas in which the third gas comprises at least one member selected from the group consisting of oxygen, nitrogen, and carbon and the third gas is present during the adding of the first and second gases.

23. (Amended) The method according to claim 19, in which the [5] second gas is nitrogen.

24. (cancelled)

25. (Amended) The method according to claim 24, in which the third gas is [chosen] is at least one member selected from the group [made up] consisting of N_xO_y, C_xH_y, [a] xN_2+yH_2 mixture, and [or a] xO_2+yN_2 mixture.

26. (Amended) The method according to claim 24, in which the third gas is [chosen] at least one member selected from the group [made up] of NH_3, N_2O, CH_4 and C_2H_6.

27. (Amended) The method according to claim 19, in which the first, second and third gases are also added before lighting of the plasma, the flow rates of the first, second and third gases, the energy required for depositing and the time of formation of the deposit being adjusted in relation to the desired thickness of the dielectric material [and its desired physical properties].

28. (Amended) The method according to claim 20, in which the steps are conducted in the following order:

placing the structure in the deposit chamber,

adding the third gas to the deposit chamber, the third gas being chosen to reduce [the] oxides present on the surface of the copper in which the third gas comprises at least one member selected from the group consisting of oxygen, nitrogen, and carbon and the third gas is present during the adding of the first and second gases,

lighting a plasma of third gas in the deposit chamber in order to reduce said oxides,

adding the first and second gases to the deposit chamber, adjustment of the flow rates of the first, second and third gases, of the energy required for the deposit and the formation time of the deposit in relation to the desired thickness of the dielectric material and its desired physical properties.

29. (Amended) The method according to claim 28, in which the third gas further comprises [is] ammonia.

30. (Amended) The method according to claim 19, in which for the purpose of obtaining a dielectric material in SiN, the first gas is silane, said chemical element of the second gas is nitrogen and the third gas further comprises [is] ammonia.

32. (Amended) A method for depositing a dielectric material on copper [apparent] on the surface of a structure, entailing the following steps:

placing the structure in a deposit chamber of [CVD type (Chemical Vapour Deposition)] chemical vapor deposition or plasma assisted chemical vapor deposition,

adding to the chamber a gas forming a precursor for the formation of the dielectric material and containing a first element able to contaminate copper and a second element able to combine with the first element to give the dielectric material,

making the deposit of dielectric material by combining the first element and the second element,

the method also comprising a step for adding an additional gas able to prevent the contamination of the copper by said element contained in the precursor gas in which the additional gas comprises at least one member selected from the group consisting of oxygen, nitrogen, and carbon and the additional gas is present during the adding of the gas containing the first and second elements.

35. (Amended) [Application of the] The method according to claim 19, wherein [to the depositing of a copper diffusion barrier layer on the surface of a] the structure [containing] comprises at least one conductor line in copper.--